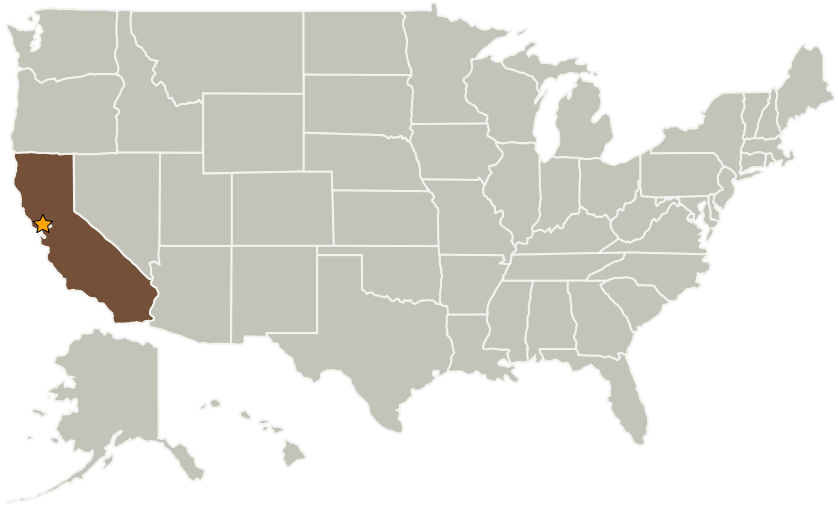
Powder Handling Device for X-ray Diffraction Analysis with Minimal Sample Preparation, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

This project consists of developing a Vibrating Sample Holder (VSH) for planetary X-Ray Diffraction (XRD) instruments. The principle of this novel sample handling technique relies on vibrations generated in a sample holder to create movements in the powdered sample. The major benefit over conventional sample handling techniques is the possibility to characterize materials with grain-sizes up to two orders of magnitude larger, with no degradation in the data quality. It allows existing planetary sample-preparation systems such as rock crushers and drills to be used in place of fine-grinding mills normally required for quality XRD analysis. A secondary benefit of the VSH is that it offers a simple means of loading and removal of samples, with a limited number of moving parts. This research will answer a critical need for sample handling devices for conducting definitive mineralogy analyses in Solar System Exploration. The Phase 1 effort will focus on a feasibility study of two critical components of the system: the thin X-ray windows required for the sample holder, and the mechanism for controlling the granular flow. The Phase 2 R&D work will lead to a VSH brassboard prototype that can be remotely operated and interfaced to a planetary XRD instrument.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
inXitu, Inc.	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Philippe C Sarrazin

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.3 Simulation
    - TX11.3.7 Multiscale, Multiphysics, and Multifidelity Simulation